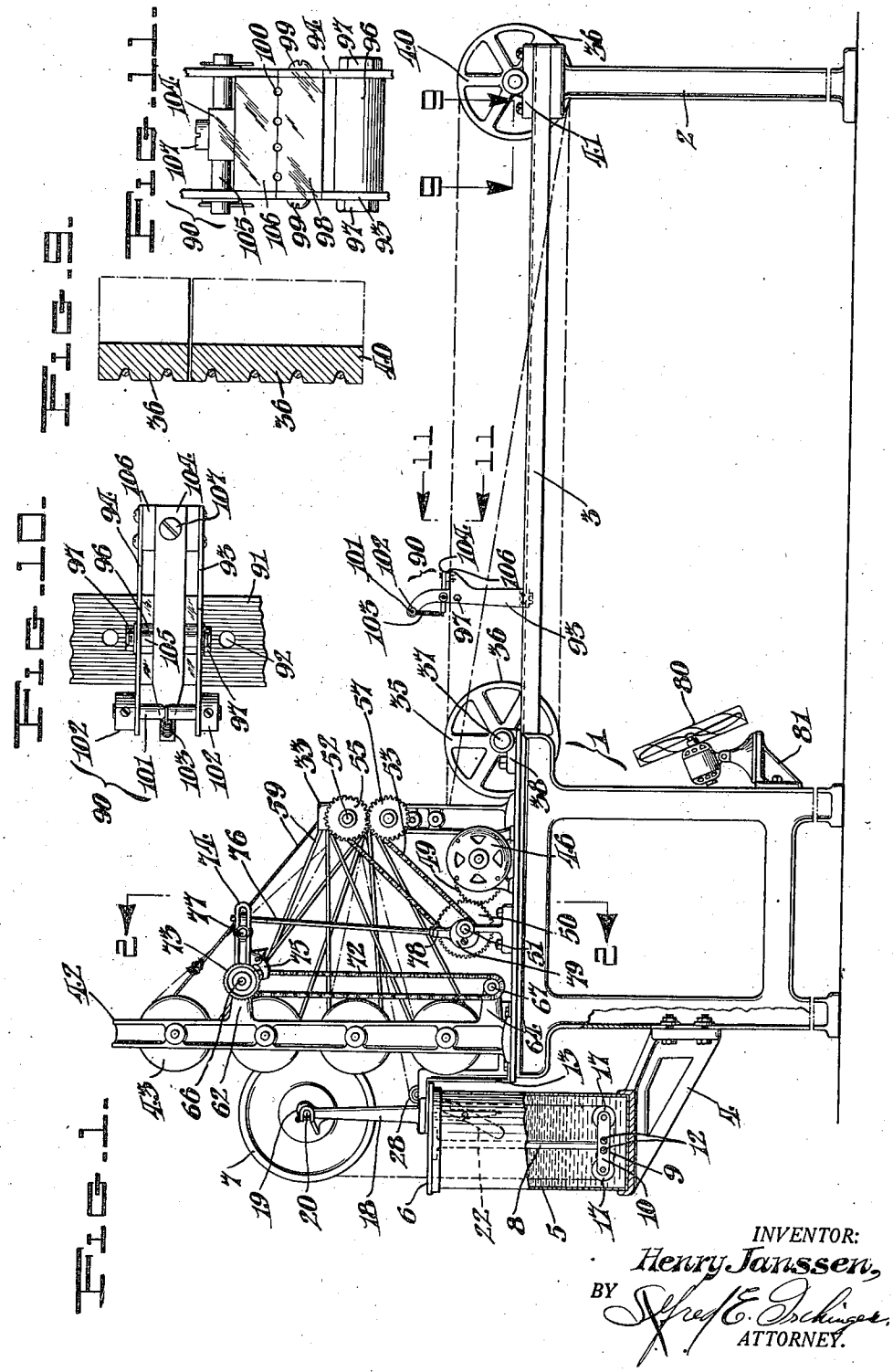
Sept. 21, 1937. H. JANSSEN 2,093,914

METHOD AND MEANS FOR TREATING YARNS

Filed Oct. 24, 1935 4 Sheets-Sheet 1



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METHOD AND MEANS FOR TREATING YARNS

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Fig. 2.

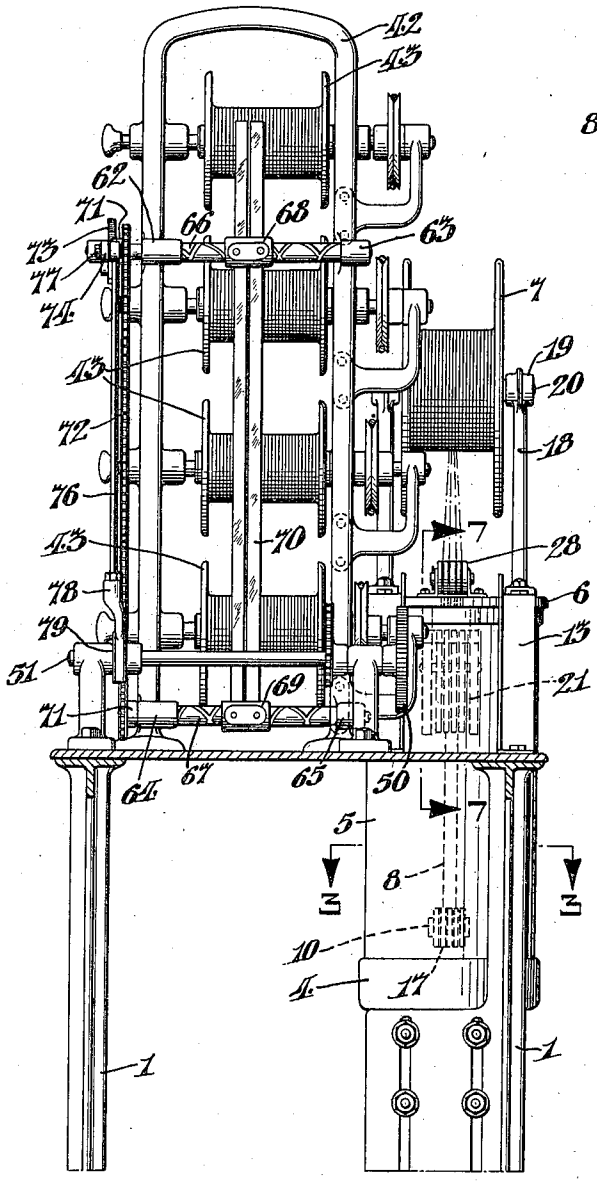


Fig. 3.

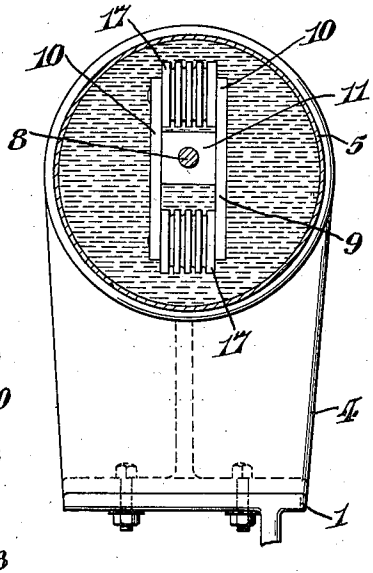
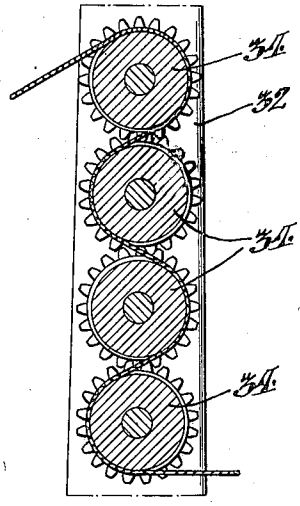


Fig. 4.



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METHOD AND MEANS FOR TREATING YARNS

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Fig. 5.

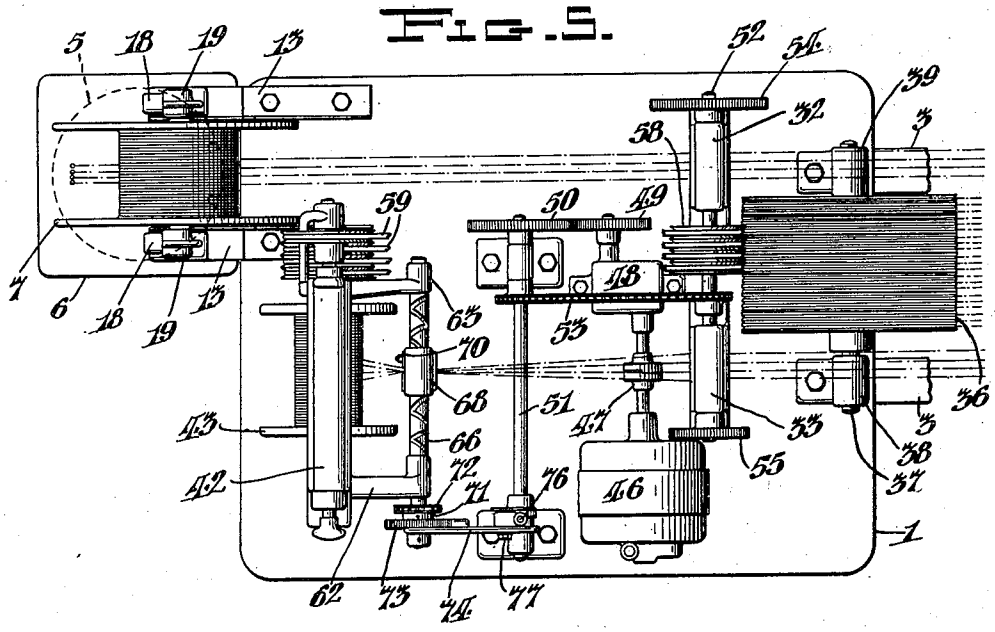


Fig. 6.

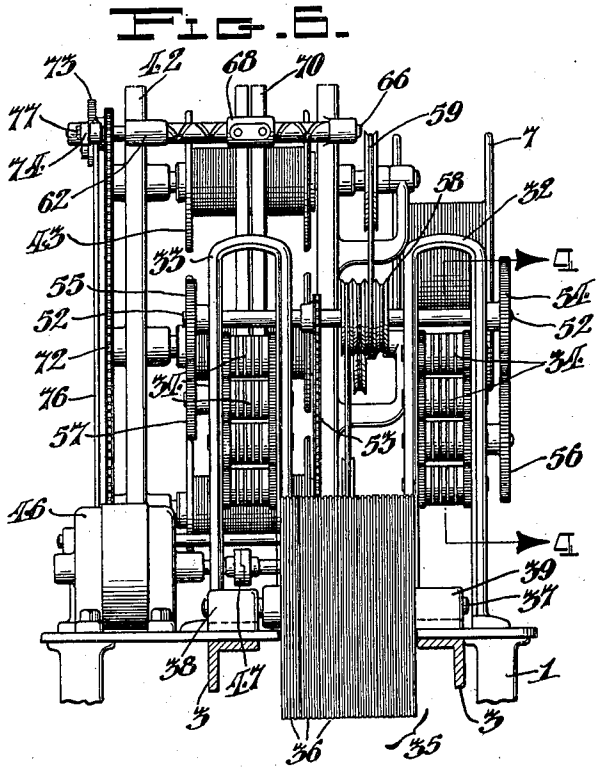


Fig. 8.

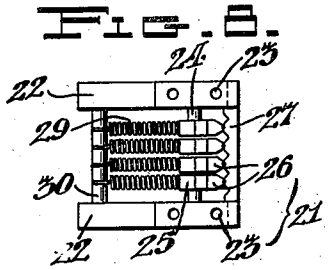
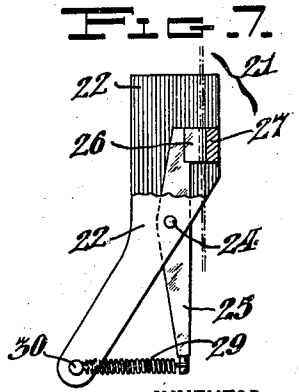


Fig. 7.



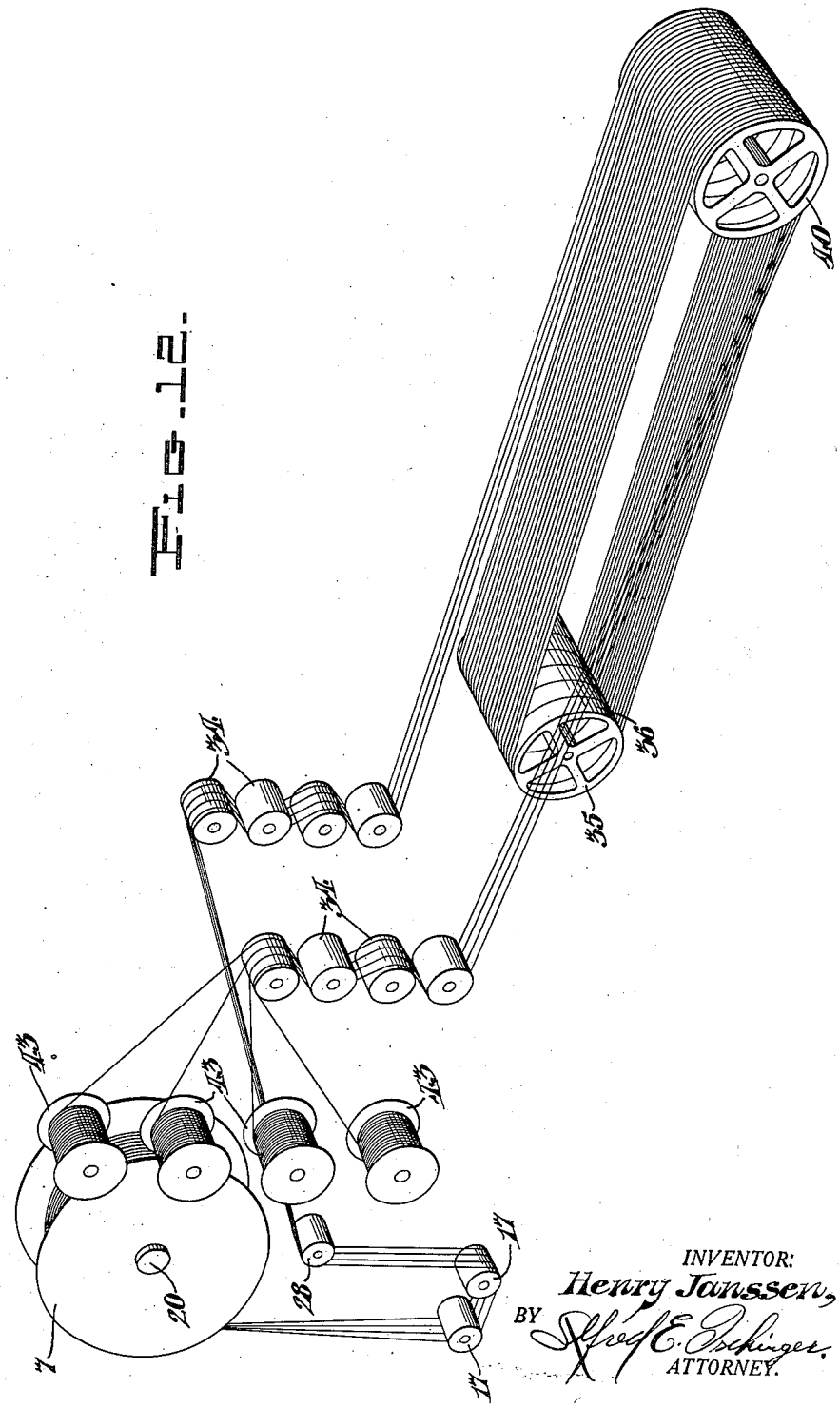
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METHOD AND MEANS FOR TREATING YARNS

Filed Oct. 24, 1935 4 Sheets-Sheet 4

Fig. 12.



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UNITED STATES PATENT OFFICE

2,093,914

METHOD AND MEANS FOR TREATING YARNS

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Application October 24, 1935, Serial No. 46,538

25 Claims. (Cl. 91—46)

This invention relates to the method of, and apparatus for processing yarns, and particularly to a new and improved method, and type of yarn treating apparatus wherein the yarn is received in quantities of a plurality of individual threads wound on a common drum, and wherein the individual yarns are traversed throughout a circuitous path including the passage through an impregnating solution, scraper and tension equalizing structure, tensioning and drying mechanisms, a forming and smoothing device, and finally wound on individual spools or bobbins.

One object of this invention is to provide a novel method, and arrangement of parts for effecting the method, of the type referred to and which will produce an efficient operating structure compact in nature and adapted to handle a plurality of individual yarns throughout the processing thereof.

Another object of this invention is to provide a novel method of, and a novel arrangement of mechanism for, sizing and treating a plurality of yarns simultaneously.

Another object of this invention is to provide a novel assembly of elements for simultaneously scraping the excess impregnating fluid from a plurality of individual yarns, and at the same time equalize the tension of the yarns as they pass this point in their travel to the drying mechanism.

Another object of this invention is to produce novel mechanism for passing the coated yarn throughout a tortuous path formed by a plurality of power driven rollers, to work the sizing into the interstices of the yarn.

Another object of this invention is to provide a novel method for, and arrangement of elements for, simultaneously drying and applying a substantially constant tension to the treated yarn while it is passing throughout a circuitous path to substantially remove the elasticity of the yarn, and give it a permanent set.

Another object of this invention is to provide new and improved means and method for treating the yarn during the drying operation, which consists in passing the individual yarns through die elements at a point where the sizing on the yarn is at a tacky or adhesive stage during the drying operation, to positively form the individual yarns, and press the loose and protruding fibers of each yarn into the body of the yarn.

Another object of this invention is to produce a novel arrangement of parts that will effect the simultaneous winding of the plurality of yarns upon individual bobbins or spools.

With these and other objects in view, which will become apparent from the following detailed description of one form of the invention shown in the accompanying drawings, the invention resides in the novel method, elements, features of construction and combination of parts in cooperative relationship as more particularly pointed out in the claims.

In the drawings:

Figure 1 is a front elevation of the novel yarn processing apparatus embodying a preferred assembly of parts constituting the invention;

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 6;

Fig. 5 is a plan view of the apparatus shown at the left in Fig. 1;

Fig. 6 is an end elevation of the apparatus shown in Fig. 5, looking from right to left;

Fig. 7 is a sectional view of the scraper elements taken along line 7—7 of Fig. 2;

Fig. 8 is a plan view of the scraper elements shown in Fig. 7;

Fig. 9 is a sectional view taken along the line 9—9 of Fig. 1;

Fig. 10 is a detail plan view of some of the elements forming the new and improved yarn treating mechanism which is shown in elevation in Fig. 1;

Fig. 11 is a front elevation of certain essential elements of the invention and looking in the direction of the arrows 11—11 of Fig. 1; and

Fig. 12 is a diagrammatic representation, in perspective, of certain essential elements of the improved mechanism illustrating the path of travel of the yarn during its treatment by the apparatus constituting this invention.

Referring particularly to the herein illustrated embodiment of the invention in Figure 1 of the drawings, a base or support 1 is mounted in spaced relation to a plurality of standards 2, and a plurality of beams 3 are rigidly fastened to the support 1 and the set of standards 2; the whole thus constituting an elongated supporting base or platform for the various yarn carrying and treating elements to be presently described.

A tank 5, which is adapted to contain a processing medium, is fixedly mounted on a bracket 4 which in turn is attached to one of the vertical ends of the base or support 1. One of the standards of base 1 preferably includes elongated slots which extend nearly to the bottom thereof,

for adjustably mounting bracket 4. This slotted connection provides means whereby the bracket 4 may be lowered so that the top of the processing tank 5 clears the bottom of the yarn guide device which is normally positioned adjacent the lower level of the processing liquid, and thus facilitates the removal of tank 5 for purposes of cleaning, refilling and threading of the yarn guide. The processing medium may be any solution or fluid with which it is desired to treat yarns or fibers. The tank 5 has a cover or lid 6 which acts as a supporting element for the primary yarn reel 7 on its outer surface, and for the guide standard 8 on its inner surface. This cover 6 is supported independently of the tank 5, by Z brackets 13, one foot of each of which is bolted to support 1 and the other feet of which are secured to cover 6. The guide standard 8 depends into the processing medium and has a yarn guide 9 attached to its lower end. This yarn guide comprises two supporting arms 10, 10 held in fixed spaced relation by block 11 and screws 12 which pass through the arms 10, 10 and into block 11. The guide standard 8 is secured to block 11 by pinning or other fastening means. There are mounted between each of the ends of arms 10, 10 grooved sheaves 17 adapted to freely rotate on axles passing through the ends of the arms 10, 10, as clearly shown in Fig. 3. The location of the grooved sheaves 17, 17 adjacent the bottom of the tank 5, provides guiding means about which the individual yarns pass, thus exposing the same to the processing medium so long as a substantial amount of the medium is present within the tank.

Two standards 18, 18 are mounted on the outer surface of lid 6, each of which is provided with bearings 19, 19 adapted to support shaft 20 which in turn supports the primary reel 7.

In addition to the guide standard 8 being attached to the under surface of lid 6, a scraper unit 21 is also fixedly attached thereto in such relation that the effective scraper action takes place along substantially a vertical plane tangent to one of the grooved sheaves 17. This scraper unit, Figs. 7 and 8, comprises brackets 22 secured to the under surface of lid 6 by screws passing into threaded holes 23. Midway of the longitudinal dimension of the brackets 22, is a pivot shaft 24 upon which is supported a plurality of scraper levers 25. Each of the levers 25 has fixed to its scraper engaging portion, a block 26 having a grooved pointed end portion. A serrated member 27 is mounted between the standards 22 for cooperation with the scraper blocks 26. The projections created by the serrations are likewise grooved, and said grooves are aligned with the grooved pointed end portions of the blocks 26. Each pair of aligned grooves forms cylindrical passages of substantially the diameter of the thread which passes therethrough during the treating thereof. For the purpose of urging the blocks 26 into cooperative relation with the serrated member 27, one end of a coiled spring 29 is attached to the lower end of each scraper lever 25. The other end of each coiled spring is attached to a rod 30 which extends between the brackets 22 and at the lower end thereof. All of these springs have identical characteristics and thus provide means for equalizing the tension on the individual yarns as they pass this point. The main reel 7 has simultaneously wound thereon a plurality of individual yarns which are fabricated from a plurality of braiding units operating in tandem. These yarns are produced under as nearly constant conditions as possible, nevertheless the rate of production varies to some extent. The simultaneous winding of these yarns on the primary drum 7 causes some of the yarns to be wound tighter than others due to the varied rate of production. It is, therefore, essential that these varying yarn tensions are compensated for and equalized prior to the passing of the yarns to the drying and tensioning mechanism. The scraper unit 21, therefore, is a dual acting device which functions to scrape the excess impregnating fluid from the individual yarns, and simultaneous therewith, to equalize the tension of each individual yarn of the plurality as they pass this point.

Two series of holes are situated in the cover 6, the holes of one of the series are arranged in alignment with the grooves of the left hand sheave 17 of the yarn guide 9, Fig. 5, while the holes of the other series are arranged in alignment with the grooves of the right hand sheave 17, as well as the cylindrical passages formed by the blocks 26 and the serrated member 27. A freely rotatable drum or sheave 28 is mounted on the outer surface of the cover 6, and it is provided with a grooved peripheral surface which is adapted to guide the yarns that are emerging from the processing tank. To this end, the sheave 28 is mounted so that its grooves are in alignment with that series of holes in the cover 6 which are arranged in alignment with the cylindrical passages formed by the blocks 26 and the serrated member 27.

Two identical inverted U-shaped standards 32 and 33 are fixedly mounted at the forward end of the base or support 1 and combinedly provide yarn tension regulating mechanism. Each of these standards is provided with a plurality of vertically arranged power driven drums 34, having aligned peripheral grooves, which are adapted to provide a tortuous path for the passage of the yarns, see Figs. 4, 6 and 12. One of the series of drums is driven at a different velocity from that of the other series, for a purpose to be hereinafter described. However, in the present embodiment of the invention, each drum of each series is geared together in a 1:1 ratio.

A compound sheave 35 made up of a plurality of individual sheaves 36 is mounted to freely and independently rotate on a shaft 37. The shaft 37 is supported by bearings 38 and 39 at the forwardmost portion of the base 1. A compound sheave 40, see Fig. 9, similar to sheave 35, is rotatably mounted in bearings 41 on the beams 3. The individual sheaves 36 of the compound sheaves 35 and 40 are provided with a number of circumferential grooves equal to the number of yarns simultaneously treated, and the spacing of the two compound sheaves provide widely separated means about which the treated yarns are passed during processing thereof.

Mounted at the rearward portion of support 1 and adjacent to the processing tank 5, is an inverted U-shaped standard 42 adapted to support a plurality of individual spools 43, each of which is adapted to receive one of the plurality of yarns as the same passes from the hereinbefore described processing apparatus. During winding of the separate yarns on the individual spools, it is necessary to provide guiding means for the yarn, in order to produce a neatly wound spool. To this end, four brackets 62, 63, 64 and 65 are mounted on the standard 42, and support shafts 66 and 67 at spaced points therealong. Each of the shafts 66 and 67 are grooved in a forward and reverse direction to form an endless travers-

ing cam path. Reciprocably operable traversing nuts 68 and 69 are mounted on the traversing screws, and have integrally attached thereto, a vertically arranged slotted guide 70 as illustrated in Fig. 2. The drive for the shafts 66 and 67, including the yarn distributing guide will be hereinafter included with the description of the main drive for the apparatus.

The driving system for the assembly, as shown in Fig. 5, comprises a motor 46 connected through a coupling 47 to a speed reducer unit 48, which drives a drive shaft 51 at a further reduced speed by gears 49 and 50. A common power shaft 52 driven from the drive shaft 51 by sprocket chain 53 and sprockets located respectively on each of the drive and power shafts, is located between and passes through the standards 32 and 33. Mounted on each end of the power shaft 52 are pinions 54 and 55 respectively. A gear 56 meshing with pinion 54 and operating in a 1:1 ratio with respect to said pinion, is fixedly attached to a shaft of one of the drums 34 within standard 32. A gear 57 meshing with pinion 55 and operating in a ratio different than that of gears 54 and 56, is fixedly attached to a shaft of one of the drums 34 within standard 33. The gear ratio of gears 55 and 57 is such that the series of drums 34 within standard 33 rotate slightly faster than those within standard 32. The gears 56 and 57 are connected with drums within the standards 33 and 32 in such relation that opposite relative rotation is imparted to each series of said drums within the respective standards. By virtue of the gear ratio of gears 55 and 57 being such as to rotate the drums 34 within bracket 33 at a faster speed than the drums 34 within bracket 32, a constant tension is imparted to the processed cords as they pass between these sets of drums. This tension is distributed substantially evenly along the cords since the sheave elements 36 of the compound sheaves 35 and 40 are independently rotatable with respect to each other. Of course, a slight difference in tension actually occurs along the yarns due to the friction of the individual elements 36 on their shafts, however, this difference is negligible and the tension applied to the yarns is substantially even throughout the circuitous path provided by sheaves 35 and 40.

As the wet sized yarns pass over the compound sheaves 35 and 40, and before they dry, the contact of the yarns with the metallic pulleys causes the fibers on the outer surface of the yarn that contact the metal sheave elements to adhere thereto, thus as the yarns continue on their travel from the sheaves these outer fibers are raised, and present an unsatisfactory product. To remedy this condition, a yarn forming and treating device indicated generally at 90, see Figs. 10 and 11, is mounted on member 91 which is provided with a series of laterally spaced holes 92 for effecting lateral adjustment of said device. This device includes two standards 93 and 94 spaced apart by a stud supporting a spacing element 96. Nuts 97 are secured to the ends of the stud thus providing a rigid frame member comprising the standards 93 and 94. Forwardly of the standards 93 and 94 is a table element 98 rigidly fixed relative to the frame member by screws 99. The upper surface of this table element is grooved as shown at 100 for receiving the individual yarns, for the purpose of forming the yarn and compressing the loose fibers protruding therefrom, into the body of the yarn. Rearwardly of the standards 93 and 94, is a shaft 101 collared as disclosed by numerals 102, and supporting a tension spring 103. A pivotal arm 104 is mounted between standards 93 and 94 on shaft 105 that is cottered at both ends. Arm 104 is rigidly fixed to shaft 105, and extends forwardly and rearwardly from said pivot. At the forward end of arm 104, is a member 106 which is complemental to table 98, and which is adapted to cooperate therewith to provide forming and pressing means for the yarns. The element 106 is fixed to the forward end of arm 104 by screw 107. The rearward end of arm 104 is provided with means connecting the free end of tension spring 103, which maintains the complemental elements 98 and 106 in cooperative position to effect the desired forming and pressing of this device. The location of this device 90 is at that point in the travel of the yarns between the sheaves 35 and 40 where the processing medium attains a tacky state. The mounting of said unit is, therefore, adjustable laterally of its supporting element 91 for the purpose of positioning the unit at the correct position for any given conditions of temperature and humidity of the surrounding atmosphere.

A grooved belt pulley 58 is centrally positioned on the power shaft 52 and is adapted to independently drive the spools 43 through individual belts 59. Sprockets 71 are fixed to each of the shafts 66 and 67, and are connected by chain 72 for the purpose of imparting similar motion thereto. In addition to the sprocket 71, one shaft is also provided with a ratchet wheel 73. Pivoted on the shaft supporting the ratchet wheel 73, is a slotted lever 74 to which is pivotally mounted a pawl 75 for cooperation with the ratchet wheel 73. One end of a lever 76 is adjustably mounted in the slot of lever 74 to vary the pawling action of pawl 75 and ratchet 73. The other end of lever 76 is provided with an eccentric strap connector 78 which is mounted, for oscillation, on an eccentric head 79 fixed to the shaft 51. Thus it will be seen that for every rotation of shaft 51, the pawl 75 racks one or more teeth of the ratchet 73, depending upon the position of the adjustable connection 77. This racking causes the reciprocably operable traversing nuts 68 and 69, and consequently the slotted guide 70 to move continuously in one, then the other direction across the spools 43 to properly guide the processed yarn thereon.

An air circulation means is provided in combination with this novel arrangement of apparatus in the form of a fan 80. A bracket 81 providing a support for fan 80 is centrally attached to a strut extending between the standards of base or support 1. The fan is so mounted on this support 81 that its delivered air passes over the strands of the treated yarn while the same pass over sheaves 35 and 40. It is, therefore, evident that the treated yarns are dried while under tension during their repeated passage over the compound sheaves 35 and 40.

In the operation of the apparatus, reel 7 is received from a fabricating machine, wherein a plurality of cords are produced simultaneously and wound together on the reel, and due to this winding, varying degrees of tension are present in the individual yarns. The reel is mounted in bearings 19, and the ends of the plurality of cords are fed as diagrammatically shown in Fig. 12, down through one series of holes in the lid 6 into the processing tank 5, around guide pulleys 17 upwardly through the scraping and tension equalizing device 21, thence through the other series of holes in lid 6 over guide pulley 28 thence

upwardly to the one series of drums **34** within standard **32**. The cords are threaded in a tortuous path throughout this series of drums thus providing means whereby the processing medium is worked into the interstices of the cord on opposite surfaces thereof. From the series of drums **34** just mentioned, the plurality of cords pass over the compound drums **40** and **35**, respectively, and at a point in the circuitous path over drums **35** and **40**, where the sizing medium reaches its tacky, or adhesive state, these individual yarns pass through the forming device. Inasmuch as the individual units **36** of the compound drums **35** and **40** have a number of grooves in their peripheral surfaces equal to the number of cords simultaneously treated, it follows that the series of cords can be respectively and simultaneously wound around the sheave element **36**, and thus each yarn of the series can be similarly treated. Upon passing around the compound drums **40** and **35**, the yarns then pass upwardly to the tortuous path provided by the series of drums **34** within standard **33**. As the series of yarns advance beyond the series of drums forming the second tortuous path, they are threaded through the vertically slotted guide **70** and finally each yarn is wound on an individual spool **43**.

It is thus seen, that a new and improved method of treating a plurality of yarns is effected, which includes the steps of passing the plurality of yarns through a sizing medium, removing the excess sizing medium and simultaneously equalizing the tension of all of said yarns, controllably tensioning the yarns while the same pass throughout a circuitous drying path, maintaining substantially constant tension on each of said yarns throughout the circuitous drying path, and moving fibers protruding from the surface of the yarns into contact with the yarns at a point in the drying path where the sizing on the yarns attains a tacky or adhesive state.

It is further manifest, that a novel arrangement of parts has been provided which will efficiently handle a plurality of yarns during the processing thereof. The apparatus provided will efficiently work the sizing into the interstices of the yarns by virtue of the tortuous path producing mechanism. The arrangement of parts includes a novel dual acting scraper and tension equalizing device. The arrangement of parts additionally provides novel mechanism for applying substantially a constant tension to each of the plurality of yarns during the drying thereof. The novel apparatus also forms the yarn and compresses the upstanding loose fibers into the body of the yarn at the point where the sizing becomes tacky thus ensuring a final product of constant form and uniform characteristics. Finally, the novel arrangement of elements provides means for winding the individual yarns of the series of yarns simultaneously treated on separate reels.

Of course, the improvements specifically shown and described, by which I obtain the above results, can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

I claim:

1. In combination with a yarn processing apparatus, a main reel having wound thereon a plurality of individual yarns, a plurality of individual reels upon which the individual yarns are wound, means located at spaced points between said main reel and individual reels adapted to apply tension to said yarns, and independently rotatable means for substantially evenly distributing the tension along said yarns between said spaced points during the operation of the apparatus.

2. In combination with a yarn processing apparatus for treating a plurality of yarns simultaneously, means applying tension to said yarns between two spaced points comprising power driven drums at each point and driven at relatively different speeds, and independently rotatable means for substantially evenly distributing the tension applied to said yarns completely along said yarns between the two points.

3. In combination with a yarn processing apparatus for treating a plurality of yarns simultaneously, means applying tension to said yarns between two spaced points comprising grooved drums at each point driven at relatively different speeds, said drums being arranged in alignment to provide a tortuous path through which the plurality of yarns are adapted to be passed, and independently rotatable means for substantially evenly distributing the tension applied to said yarns completely along said yarns between the two points.

4. In a yarn processing apparatus, means for supplying yarn, means for coating said yarn with a processing medium as it leaves the supply means, yarn tensioning means located at spaced points in the apparatus, means between said points for substantially evenly distributing the tension along said yarn comprising compound sheaves each including a plurality of independent loosely rotatable sections having single strand contact with the yarn.

5. In a yarn processing apparatus, means for supplying a plurality of individual yarns, means for simultaneously coating said yarns as they leave the supply means, yarn tensioning means located at spaced points in the apparatus, means between said points for substantially evenly distributing the tension along said yarns comprising compound sheaves each including a plurality of independent loosely rotatable sections having single strand contact with the yarns.

6. In a yarn processing apparatus, means for supplying yarn, means for coating said yarn with a processing medium as it leaves the supply means, yarn tensioning means located at spaced points in the apparatus, means between said points comprising compound sheaves each including a plurality of independent loosely rotatable sections, said yarn adapted to encircle said sheaves a plurality of times, and each section of said compound sheaves adapted to support one strand of said yarn, whereby tension applied to said yarn will be substantially evenly distributed throughout the travel of the yarn between said points.

7. In a yarn processing apparatus, a supply reel having wound thereon a plurality of individual yarns, means for simultaneously subjecting all of said yarns to a processing medium, means effecting the movement of said yarns at different rates of speed through tortuous paths at a plurality of stations throughout the apparatus, and means located between said stations comprising a plurality of tension equalizing sheaves including a plurality of independent sections mounted on a common axis, each of said sections being adapted to support one of the plurality of yarns being treated.

8. In a yarn processing apparatus, a supply reel having wound thereon a plurality of individual yarns, means for simultaneously subjecting all of said yarns to a processing medium,

means effecting the movement of said yarns at different rates of speed through tortuous paths at a plurality of stations throughout the apparatus, said means including a plurality of sets of grooved drums driven in tandem, and means located between said stations comprising a plurality of tension equalizing sheaves including a plurality of independent sections mounted on a common axis, each of said sections being adapted to support one of the plurality of yarns being treated.

9. In a yarn processing apparatus, a supply reel having wound thereon a plurality of individual yarns, means for simultaneously subjecting all of said yarns to a processing medium, means effecting the movement of said yarns at different rates of speed through tortuous paths at a plurality of stations throughout the apparatus, said means including a plurality of sets of grooved drums driven in tandem, one of said sets rotating in an opposite relation relative to another set, and means located between said stations comprising a plurality of tension equalizing sheaves including a plurality of independent sections mounted on a common axis, each of said sections being adapted to support one of the plurality of yarns being treated.

10. In a yarn processing apparatus, the combination with a reel having a plurality of individual yarns wound thereon, a plurality of individual reels upon which the individual yarns are simultaneously wound after processing, means located at spaced points in the apparatus for tensioning the plurality of yarns simultaneously, means located between said points comprising a plurality of compound sheaves, said sheaves each comprising a plurality of independent relatively rotatable sections having grooved peripheral surfaces, the number of grooves in each surface corresponding to the number of yarns simultaneously treated.

11. In combination with yarn processing apparatus, an adjustably mounted sizing tank, an independently mounted lid therefor, means attached to the upper surface of said lid for supporting a reel containing yarn to be processed, and the under surface of said lid supporting a yarn guide unit extending down into the sizing medium, and also supporting a scraper unit through which said yarn is adapted to pass, whereby a compact unit including the supply of yarn, sizing medium and scraping mechanism is produced, and whereby the sizing tank can be lowered and removed from the apparatus without affecting the remainder of the apparatus.

12. In a yarn processing apparatus, common reel means supporting a plurality of independent yarns adapted to be treated by said apparatus, a tank containing sizing medium through which said yarns are adapted to be passed, spaced means comprising compound sheaves made up of independent sections over which said yarns are adapted to pass, the combination with said tank of scraping and tension equalizing means comprising a plurality of independently pivoted fingers cooperating with a complementary member, and between which the individual yarns are adapted to pass, thereby relieving the same of surplus sizing medium, and ensuring the individual yarns being under equal tension as they pass therethrough.

13. In a yarn processing device of the class described, common reel means supporting a plurality of independent yarns, a tank containing sizing medium through which said yarns are adapted to be passed, spaced compound sheaves, comprising a plurality of independent rotatable sections over which said yarns are adapted to pass, and air circulatory means cooperating with said sheaves, the combination with said tank, of scraping and tension equalizing means comprising a plurality of independently pivoted fingers, resilient means urging said fingers to cooperate with a complementary member for relieving the yarns of surplus sizing and simultaneously equalizing the tension of the individual yarns as they pass between the fingers and the cooperating member.

14. In combination with a yarn processing apparatus, a primary reel supporting a plurality of yarns, a sizing tank through which said yarns are adapted to be passed, a plurality of mechanisms providing tortuous paths at different points in the apparatus through which the yarns are adapted to pass, said mechanisms adapted to be driven at different rates of speed to tension the yarns, tension equalizing means located between said points comprising a plurality of spaced compound sheaves about which said yarns are adapted to be passed, each sheave comprising a plurality of individual relatively rotatable sections, a plurality of individual reels adapted to receive the individual yarns, and single guiding means simultaneously guiding the plurality of yarns on their respective reels.

15. In combination with a yarn processing apparatus, a primary reel supporting a plurality of yarns, a sizing tank through which said yarns are adapted to be passed, means providing a tortuous path through which said yarns are adapted to pass comprising a set of vertically aligned horizontal drums driven in tandem, each drum provided with circumferential grooves and all of said grooves being aligned, whereby the sizing is worked into the interstices of the plurality of yarns during their passage through said tortuous path.

16. In a yarn processing apparatus wherein a plurality of yarns are adapted to be simultaneously treated and passed throughout a circuitous path during processing thereof, positive drive means operating at a plurality of stations throughout said circuitous path and at different speeds to tension the yarns between said stations, tension equalizing and drying means positioned between said stations, and means cooperating with and positioned relative to said drying means for forming and smoothing the yarns when the processing medium on said yarns attains a tacky state.

17. A yarn processing apparatus of the class described comprising a main reel having wound thereon a plurality of yarns under varying degrees of tension, a tank supporting a processing medium through which said yarns are to be passed, positive drive means located at a plurality of stations throughout said apparatus and operating at different speeds for applying tension to said yarns, means comprising individual spring urged die fingers through which said yarns are adapted to pass prior to engagement with said positive drive means, whereby the excess processing medium is removed from said yarns, and whereby each yarn of said plurality of yarns enters said positive drive means under equal tension.

18. In a yarn processing apparatus comprising a supply means, a tank containing a processing medium, tensioning and drying means, the combination with said drying means of means adjustably located within the extent of said drying

means for engaging said yarn at the point where the processing medium on said yarn attains a tacky or adhesive state whereby the loose fibers of said processed yarn are forced permanently into the body of the yarn, and whereby said yarn is formed into final cross-sectional shape.

19. In a yarn processing apparatus comprising a supply means, a tank containing a processing medium, tensioning and drying means, the combination with said drying means, of means located within the extent of said drying means for moving loose fibers protruding beyond the surface of the yarn into contact therewith at the point where the processing medium on said yarn attains a tacky or adhesive state.

20. The method of treating a plurality of yarns simultaneously which comprises the steps of passing the plurality of yarns simultaneously through a sizing medium, removing the excess sizing medium from the yarns and simultaneously equalizing the tension of all of said yarns, controllably tensioning said plurality of yarns while the same pass throughout a circuitous drying path, maintaining said tension substantially constant on each yarn and in correspondence with the other yarns throughout said drying path, and moving the protruding fibers of the surface of said yarns against said surface at a point in the drying path where the sizing medium on the yarns attains a tacky or adhesive state.

21. The method of treating a plurality of yarns simultaneously which comprises the steps of passing the plurality of yarns through a sizing medium, removing the excess sizing medium from the yarns, controllably tensioning said plurality of yarns while the same are passing throughout a circuitous drying path, and maintaining said tension substantially constant on each yarn and in correspondence with the other yarns throughout said drying path.

22. The method of treating a plurality of yarns simultaneously which comprises the steps of passing the plurality of yarns through a sizing medium, removing the excess sizing medium from the yarns and simultaneously equalizing the tension of all of said yarns, controllably tensioning said plurality of yarns while the same pass throughout a circuitous drying path, whereby said plurality of yarns are subject to an identical method of treatment.

23. The method of treating a plurality of yarns simultaneously which comprises the steps of passing a plurality of yarns simultaneously through a sizing medium, removing the excess sizing medium from the yarns, controllably tensioning said plurality of yarns while the same pass throughout a circuitous drying path, and moving the protruding fibers of the surface of each of said yarns against its surface at a point in the drying path where the sizing medium on the yarns attains a tacky or adhesive state.

24. A scraper and tension equalizing unit for yarn processing apparatus adapted to treat a plurality of yarns simultaneously comprising a plurality of individual means one for each of said yarns and each including a pair of members arranged for relative movement transverse to the axis of the yarn and constructed to engage substantially the entire surface thereof, and means whereby said pairs of members engage each yarn under substantially uniform conditions of pressure, whereby said yarns are relieved of excess processing medium and are substantially equally tensioned as they are drawn through said unit.

25. In combination a device for simultaneously treating a plurality of yarns including a yarn tension mechanism, independently yieldable means located between the entrance to said device and said yarn tension mechanism and comprising a pair of members for each yarn arranged for relative movement transverse to the axis of the yarn and constructed to engage substantially the entire surface thereof, and means to move the members of each of said pairs for simultaneously exerting substantially uniform pressure on all of the yarns, whereby said yarns are fed to said yarn tension mechanism under substantially equal conditions of tension.

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